**COS 300045 – DATA VISUALISATION**

**Project Stand Up 1**

**DESIGN BOOK**

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**Introduction**

**Background**

Student performance is influenced by various academic, social, and behavioural factors. Schools often struggle to identify at-risk students early enough to provide timely interventions. Visualising and analysing key data points from student backgrounds, habits, and grades can offer insight into underlying learning difficulties or disengagement.

**Motivation**

Many students experience failure not due to lack of potential, but because early warning signs go unnoticed. Teachers often lack the tools to analyse student data holistically. By leveraging data visualisation, educators can gain an accessible, visual understanding of which students may need help, especially those at risk of failing or showing signs of behavioural issues such as low motivation, absenteeism, or low engagement.

**Purpose**

The goal of this project is to build an interactive data visualisation tool using real-world student performance data. This tool aims to help educators identify students who may require academic or behavioural support early in the term. The project uses KNIME and GitHub to process, analyse, and visualise the dataset from UCI’s Student Performance Database.

**Exploratory Data Analysis**

**Study Time vs Final Grade**

To understand how weekly study time affects student performance, the dataset was grouped by the studytime attribute and the average final grade (G3) was calculated. Results showed a positive trend where students who dedicated more time to study achieved higher grades. Specifically, those in the lowest study group had an average grade of 10.0, while those in the highest group averaged above 11.2.

A bar chart was generated using KNIME to visualise this relationship, with studytime as the category axis and the average grade as the value. This early insight supports the assumption that consistent study habits are closely related to academic success**.**

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**Past Failures vs Final Grade**

To further explore the impact of academic history on performance, the dataset was grouped by the failures attribute to calculate the average final grade (G3). The analysis revealed a strong negative correlation — students with no prior failures had an average grade of 11.25, while those with three prior failures had an average of only 5.69.

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This suggests that academic difficulties in earlier years have a substantial impact on final performance outcomes. The data reinforces the importance of early academic support and intervention.